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PROCEEDINGS
OF
THE ROYAL SOCIETY.

1831-1832.

No. 7.

November 17, 1831.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.,
President, in the Chair.

The following Papers were read. The first was entitled, "Researches in Physical Astronomy—'On the Theory of the Moon.'" By J. W. Lubbock, Esq. V.P. and Treasurer of the Royal Society.

This paper is a continuation of the author's former paper on the same subject, in which he gives the developments which are required in the second approximation, or that in which the square of the disturbing force is retained.

The author has not yet attempted to obtain numerical results, but he considers this method of solution equally advantageous with the method hitherto adopted, and that the calculation which would tend to perfect the tables of the moon is a desideratum in physical astronomy.

The author has obtained numerical results in the first approximation ; the value of the variation agrees within a few seconds with the result of Newton in the third volume of the *Principia*.

The next paper was entitled, "On the Tides," by the same.

This paper contains tables of the results of observations made at Brest, with regard to the principal inequality of the tides, or that which is independent of the parallaxes and declinations of the moon and sun, and depends solely on the moon's age, that is, on the time of her passage through the plane of the meridian ; from which it appears that the tables of the tides for London are not applicable to Brest, by merely changing the *establishment*, that is, by adding a constant quantity, as has been hitherto supposed ; and the same remark applies to any distant parts.

The third paper was entitled, "On the Structure of the Human Placenta and its connection with the Uterus." By Robert Lee, M.D. F.R.S. Physician to the British Lying-in Hospital.

In the year 1780 Mr. John Hunter presented a paper to the Royal Society, in which he laid claim to the discovery of the true structure of the placenta, and of its vascular connections with the uterus. From

the appearances which he observed in a preparation of the gravid uterus, after both the veins and arteries had been injected, and a longitudinal incision made through the anterior parietes of the uterus where the placenta adhered to its internal surface, he was led to conclude that the arteries which are not immediately employed in conveying nourishment to the uterus go on towards the placenta, and proceeding obliquely between it and the uterus, pass through the decidua without ramifying; and that just before entering the placenta, after making two or three spiral turns, they open at once into its spongy substance. The corresponding veins he represents as commencing from the spongy substance of the placenta by wide mouths, and after passing obliquely through the decidua, entering the substance of the uterus and immediately communicating with the proper veins of that organ. Dr. Wm. Hunter's description of the same vessels accords with that of his brother. He regards the placenta as consisting of two distinct parts, namely, an umbilical portion which belongs to the fœtus, and a uterine portion, which belongs to the mother, each having its peculiar system of arteries and veins; and he supposes that while, in the fœtal portion, the arteries and veins form continuous canals, these two sets of vessels communicate, in the uterine portion, by the intervention of cells, into which the arteries terminate, and from which the veins begin.

The subject was afterwards investigated by Noortwyck, Rœderer, and Haller, but without any satisfactory result; and the doctrines laid down by the Hunters were generally acquiesced in by subsequent anatomists.

The author of the present paper having had opportunities of examining six gravid uteri, and many placentaë expelled in natural labour, finds reason to conclude that no cellular structure, such as that described by Dr. Hunter, exists in the human placenta, and that there is no connection between this organ and the uterus by great arteries and veins. He thinks himself warranted in concluding that the placenta does not consist of two portions, maternal and fœtal, but that the whole of the blood sent to the uterus by the spermatic and hypogastric arteries, except the small portion supplied to its parietes and to the membrana decidua by the inner membrane of the uterus, flows into the uterine veins or sinuses; and, after circulating through them, is returned into the general circulation of the mother by the spermatic and hypogastric veins, without entering the substance of the placenta. Such have been the results of the author's own examinations of the structure of the gravid uterus, both when injected and uninjected; and also of an examination of the preparations of that organ, contained in the Hunterian Museum at Glasgow, made at his request by Dr. Nimmo. These views are also corroborated by the careful examination by the author of a preparation of the uterus with the placenta adhering to its inner surface, in the Museum of the Royal College of Surgeons of London, which is supposed to have been put up by Mr. Hunter himself nearly fifty years ago. The cellular structure of the placenta has been too hastily inferred from the masses of wax found interspersed in its substance,

after the vessels have been injected; but this appearance the author ascribes wholly to extravasation in consequence of rupture of the vessels.

November 24, 1831.

JOHN WILLIAM LUBBOCK, Esq. V.P. and Treasurer,
in the Chair.

A paper was read, entitled, "Facts adduced in refutation of the assertion that the Female *Ornithorhynchus Paradoxus* has Mammæ." By Sir Everard Home, Bart. F.R.S.

The author, after a minute examination, in which he was assisted by Mr. Hartshorn and Mr. Bauer, of three specimens of female ornithorhynchi sent to him by Governor Darling, could not discover mammæ, although these parts are represented as existing by Professor Meckel.

A paper was next read, entitled, "On an Inequality of long Period in the Motions of the Earth and Venus." By George Biddell Airy, A.M. Plumian Professor of Astronomy and Experimental Philosophy in the University of Cambridge.

The author had pointed out, in a paper published in the Philosophical Transactions for 1828, on the corrections of the elements of Delambre's Solar Tables, that the comparison of the corrections of the epochs of the sun and the sun's perigee, given by the late observations, with the corrections given by the observations of the last century, appears to indicate the existence of some inequality not included in the arguments of those tables. As it was necessary, therefore, to seek for some inequality of long period, he commenced an examination of the mean motions of the planets, with the view of discovering one whose ratio to the mean motion of the earth could be expressed very nearly by a proportion of which the terms are small. The appearances of Venus are found to recur in very nearly the same order every eight years; some multiple, therefore, of the periodic time of Venus is nearly equal to eight years. It is easily seen that this multiple must be thirteen; and consequently eight times the mean motion of Venus is nearly equal to thirteen times the mean motion of the earth. The difference is about one 240th of the mean annual motion of the earth; and it implies the existence of an inequality of which the period is about 240 years. No term has yet been calculated whose period is so long with respect to the periodic time of the planets disturbed. The value of the principal term, calculated from the theory, was given by the author in a postscript to the paper above referred to. In the present memoir he gives an account of the method of calculation, and includes also other terms which are necessarily connected with the principal inequality. The first part treats of the perturbation of the earth's longitude and radius vector; the second of the perturbation of the earth in latitude; and the third of the perturbations of Venus depending upon the same arguments.